

# Intel Developer FORUM

**Paul S. Otellini**

President and Chief Operating Officer

**AFTER THE BUBBLE  
THE SURGE**

**PLATFORMS**

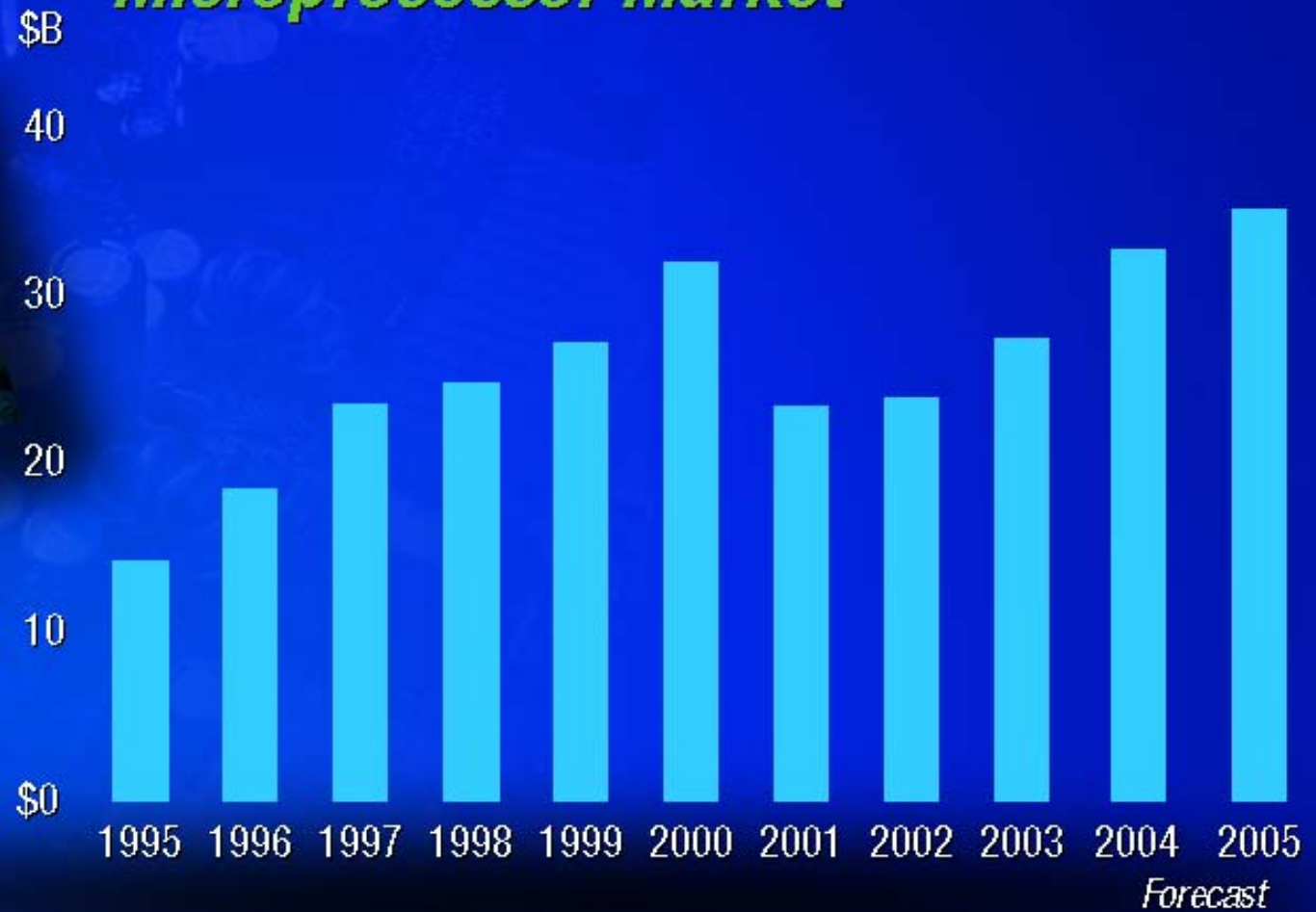
**The Next  
INFLECTION  
POINTS**



Computer

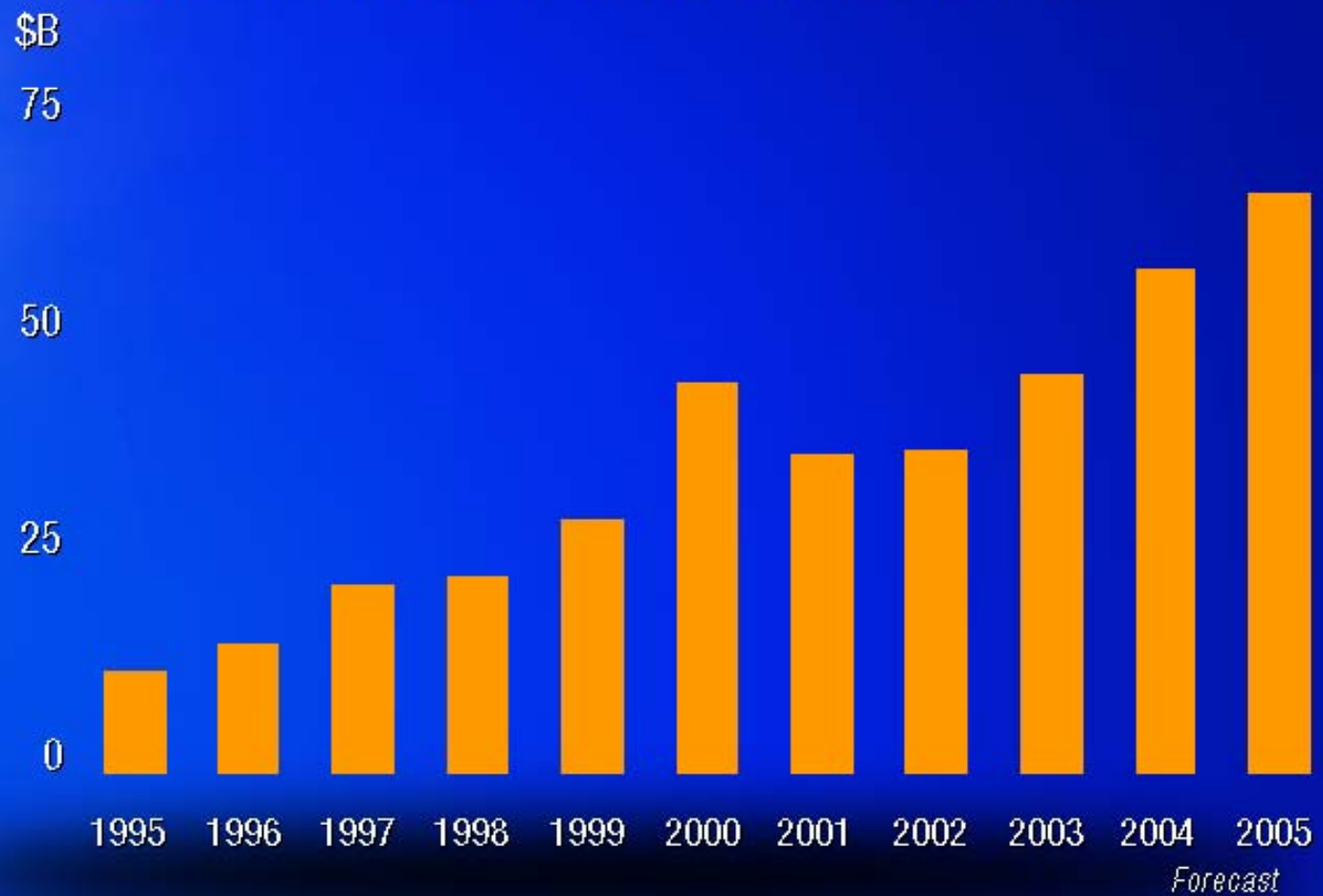
# ***Industry Growth***

***Microprocessor Market***



# Communications *Industry Growth*

## *Communications Silicon Market*







*Convergence  
Happened*



*The Digital  
Effect*

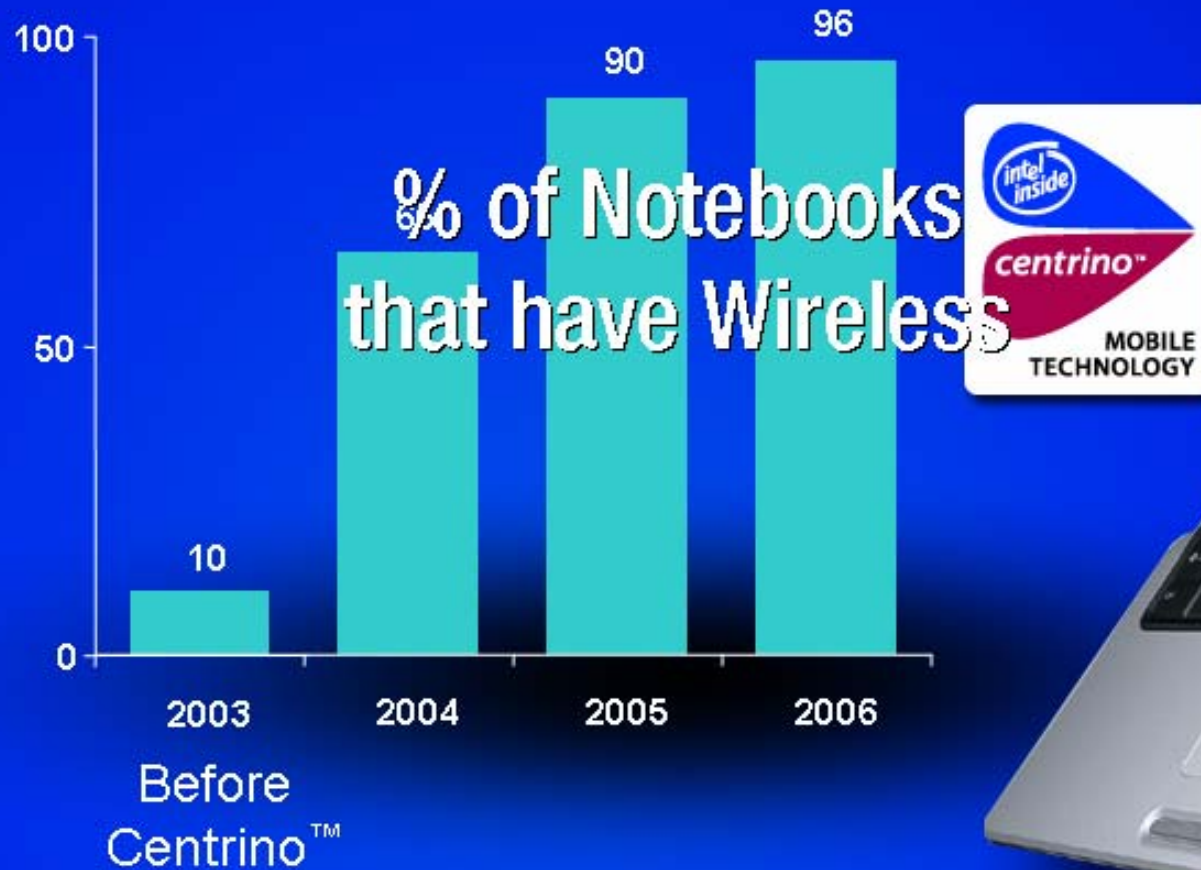


*The Next  
3 Billion Users*

# Growth Drivers

# What Happened...

## Notebooks ARE Wireless

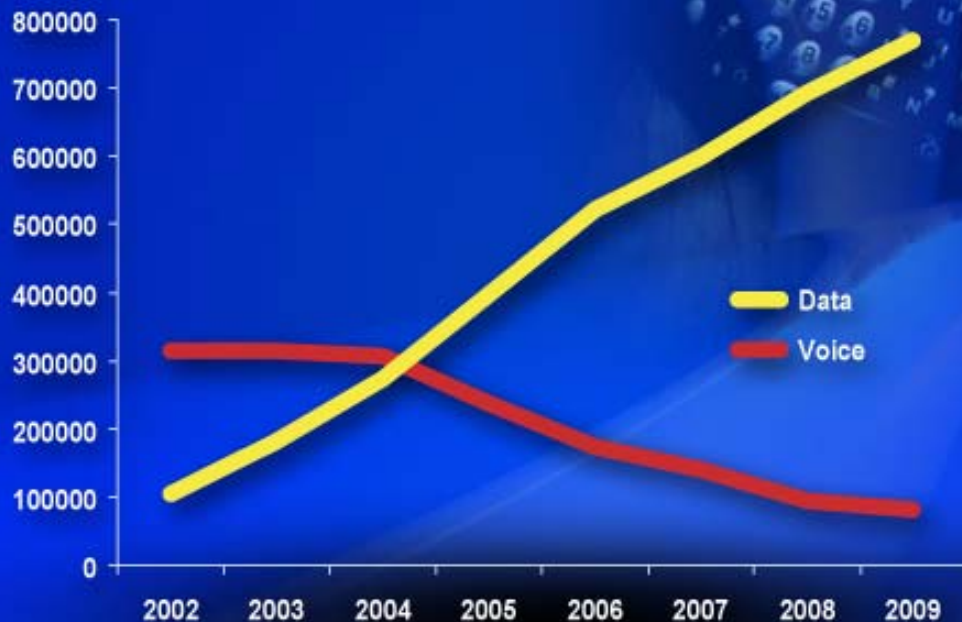




# What Happened...

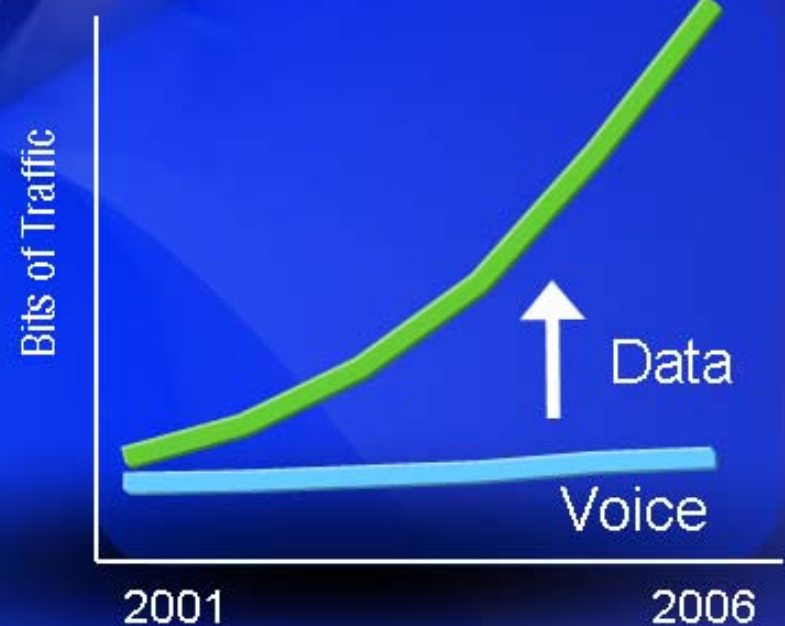
2004: Data Phones  
Cross-over Voice

Cell Phone Units by Feature Set



Source: WebFeet Research

Data Traffic: 56% Annual  
Growth thru 2006

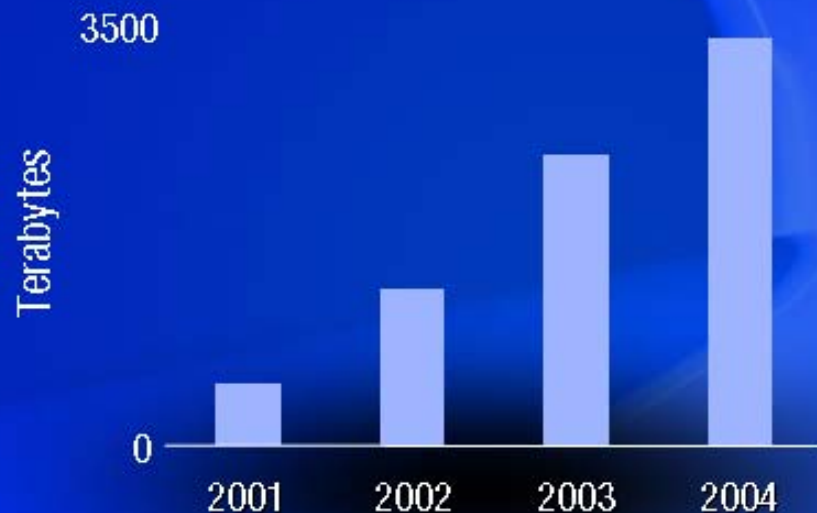


Source: Goldman Sachs and Co., McKinsey & Company; Dec. 2002

# The DIGITAL Effect

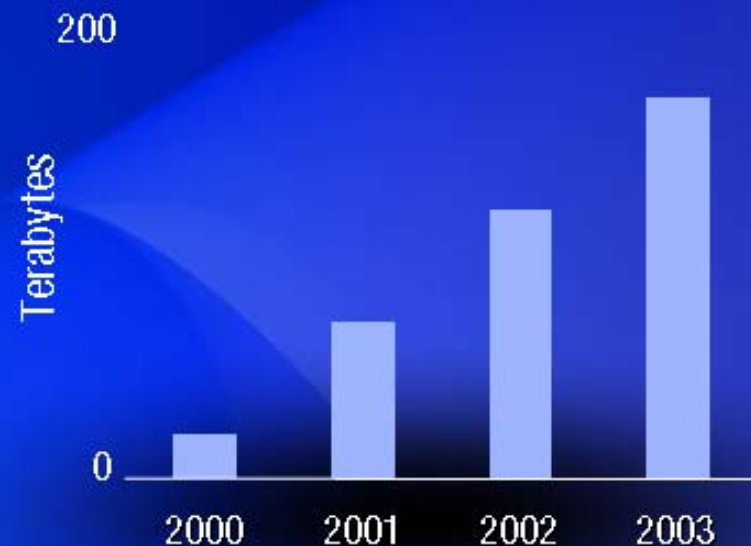
Corollary to Moore's Law

**Total Digital Info Intel-Wide**



Source: Intel

**Total Size – Surface of Web**



Source: UC Berkeley



# DIGITAL Consequence

**Today**



**700 Million Viewers  
in 7 years**

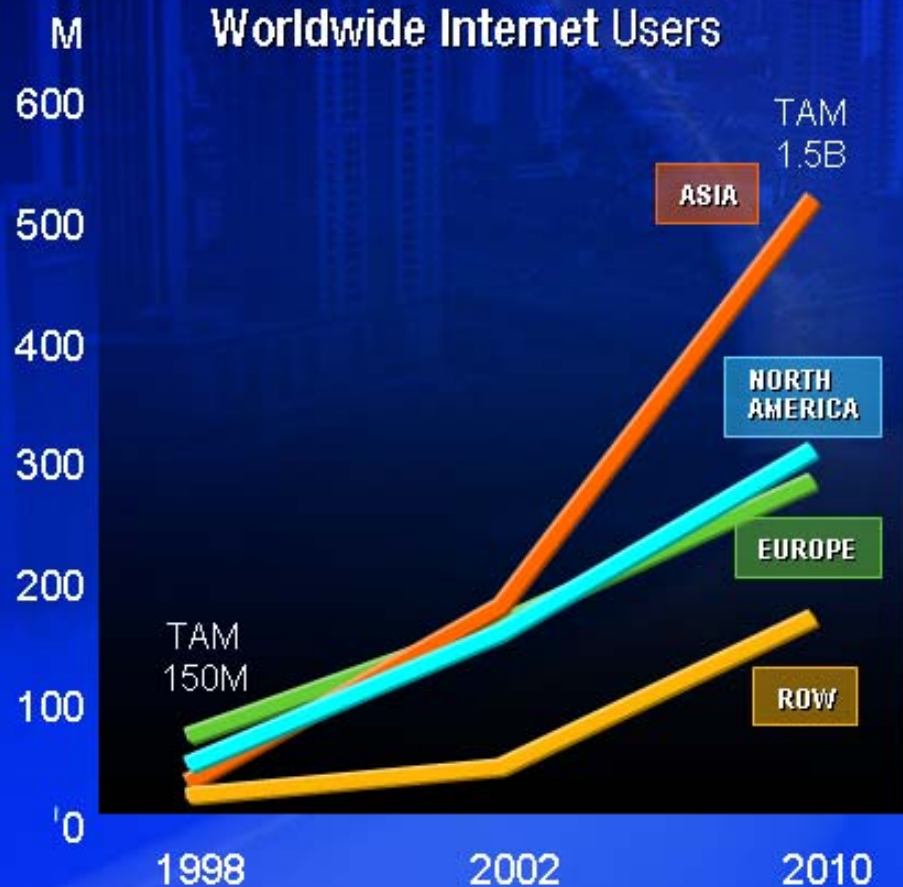
**Next Threshold**

**1 Billion  
Viewers  
in  
ONE  
YEAR**

# THE NEXT 3 BILLION USERS

## Opportunities

Worldwide Internet Users



Source: Morgan Stanley

## Consequence

Blazing New Ground

10X Intel City Coverage in 4 Years



Source: Intel



# Moore's Law

remains the fundamental enabler...





....more than  
**MHz**

**WAS...**  
*MHz, MHz, MHz*



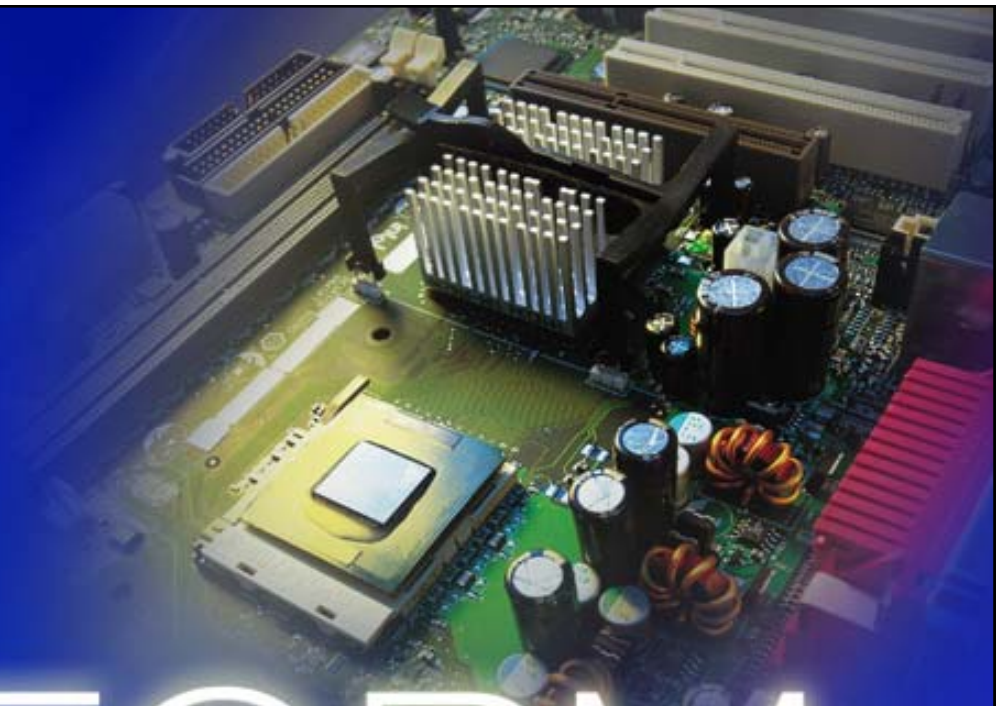
**IS...**

*User Features*

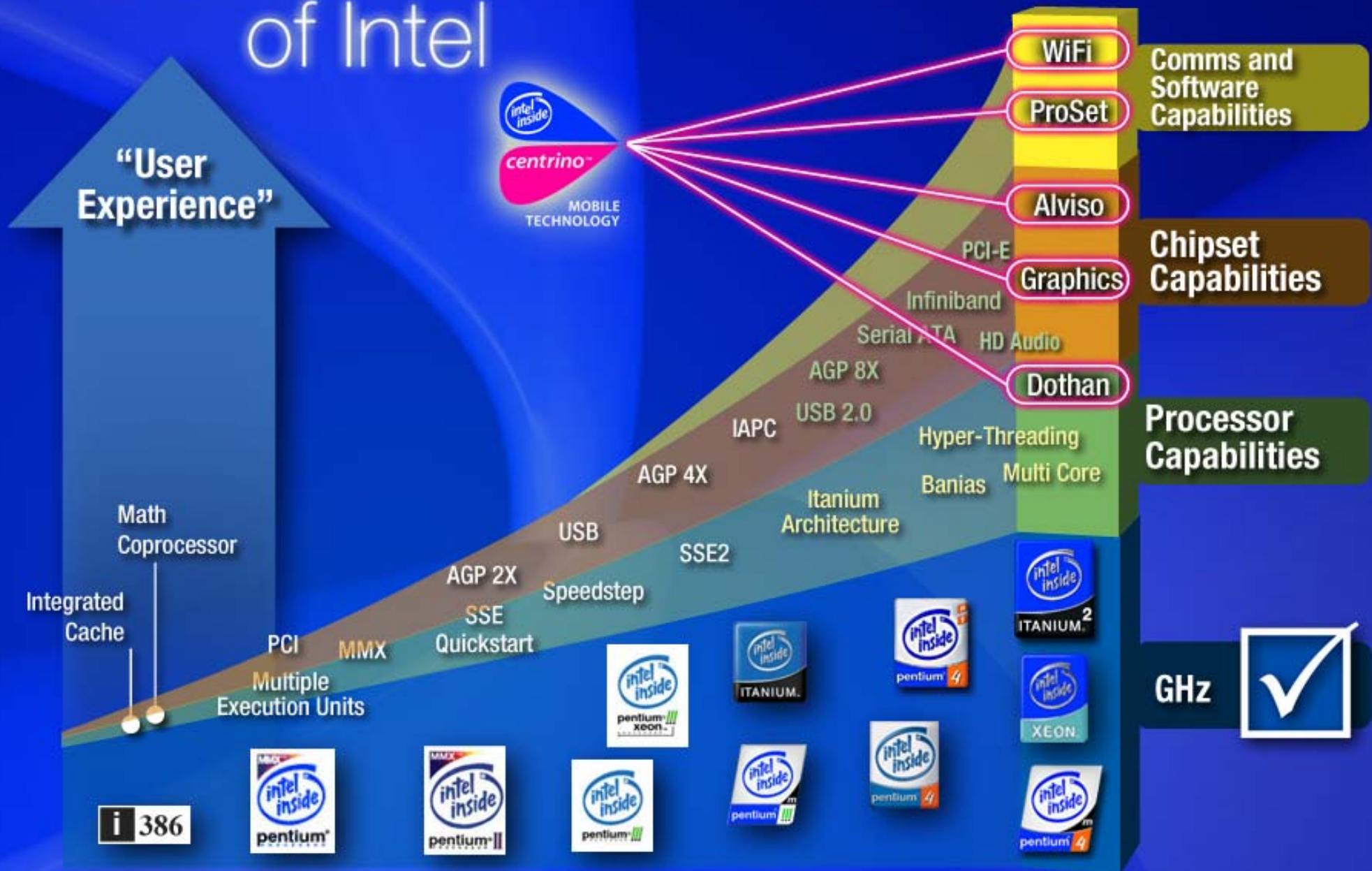
Wireless, Security, Form Factor



# THE PLATFORM



# the Platform-ization of Intel







# The Digital Home Platform

Products & Ecosystem

2004

## **Getting the Digital Home into Production**

- DLNA: 1.0 spec in June: 1st products Q4'04
- Entertainment PCs: Products Available Now
- DTCP/IP: 1st products 2H'04



SONY



d5 digital

NETGEAR®



# DTCP-IP

Delivering premium content



A blue-tinted photograph of a living room. In the center, a television sits on a stand, displaying a landscape scene of a beach and ocean. To the left of the television, a dark-colored dog is lying down on the floor. The background shows a window and some furniture, all under a monochromatic blue filter.

# **Microsoft®**

“DTCP-IP is an important enabling technology for content protection in the digital home and Microsoft is working with Intel to support it in future Windows Media products.”

**Will Poole**  
Senior Vice President  
Windows Client Business



# The Underlying Platform Technologies



# Template for Innovation



GHz

A detailed, high-magnification photograph of a microprocessor die, showing its intricate circuitry and various functional blocks. The die is rectangular and has a complex, multi-colored appearance due to the different materials and structures used in its fabrication.



Cache

A detailed, high-magnification photograph of a microprocessor die, showing its intricate circuitry and various functional blocks. The die is rectangular and has a complex, multi-colored appearance due to the different materials and structures used in its fabrication.

The T's

HT

LT

EM64T

VT

iAMT

# The First “T”...

Hyper-Threading Technology

Delivering Performance  
thru Parallelism

	2002	2004
<b>Clients</b>	0%	55%
<b>Servers</b>	0%	100%

Announced: Fall 2001  
Introduced: Nov. 2002  
Today: Pervasive





# The "T's"

## PROGRESS REPORT

Memory  
Addressability



**Servers and W/S**  
**Available NOW**  
(Windows and Linux)

**Clients**  
**Available with**  
**Windows 64 bit**

Security



**Available**  
**with**  
**Longhorn\***

Reliability



**Available**  
**with**  
**Longhorn\***

\*subject to development schedules

# Virtual Technology





# Manageability The Latest “T”

Memory  
Addressability



**Servers and W/S  
Available NOW  
(Windows and Linux)**

**Clients  
Available with  
Windows 64 bit**

Security



**Available  
with  
Longhorn\***

Reliability



**Available  
with  
Longhorn\***

Manageability



\*subject to development schedules



“Zero management – by  
insourcing to silicon”

Gartner, 2004

# Addressing the Manageability Dilemma

80% of IT spending is for keeping the business running – not transformation\*

- Intel® Cross Platform Manageability Program  
...From Mobile to Servers
- First Product: Intel® Active Management Technology  
...Out of Band trouble shooting – regardless of system state
- Public Industry specification coming Spring IDF 2005



# Cache

Performance for  
Today's Apps



Moore's Law driving

# The Next **INFLECTION POINTS**

Communications: Wireless Broadband  
Computing: Parallelism



# Evolution of Connectivity



## Narrowband

2000\*

Dialup: 90%

Fixed Broadband: 10%



## Broadband

2004\*

Dialup: 49%

Fixed Broadband: 51%

Wifi: 8%



## Broad**ER**band

2008\*

Dialup: 22%

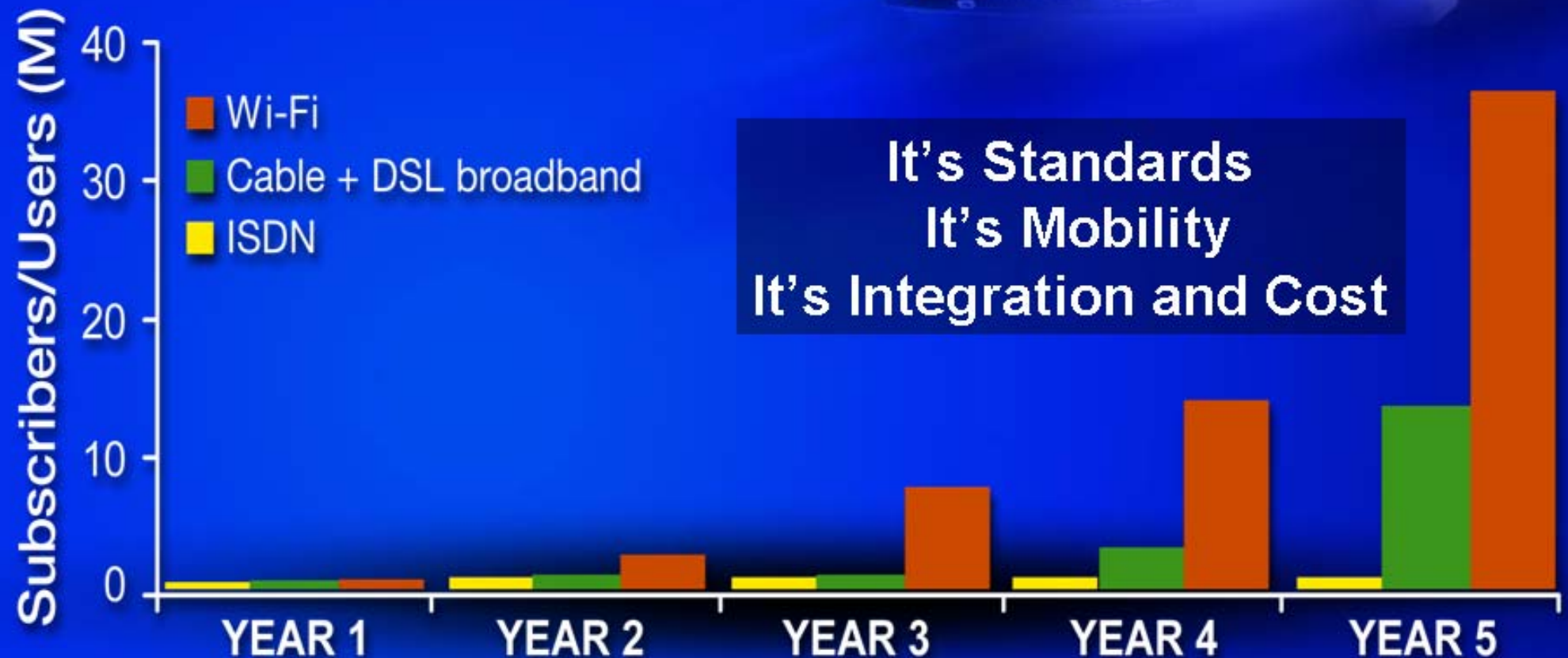
Fixed Broadband: 70%

Wifi: 40%

WiMAX: 8%

# Broadband meets Wireless Viral Growth

Adoption Comparison  
The First 5 Years



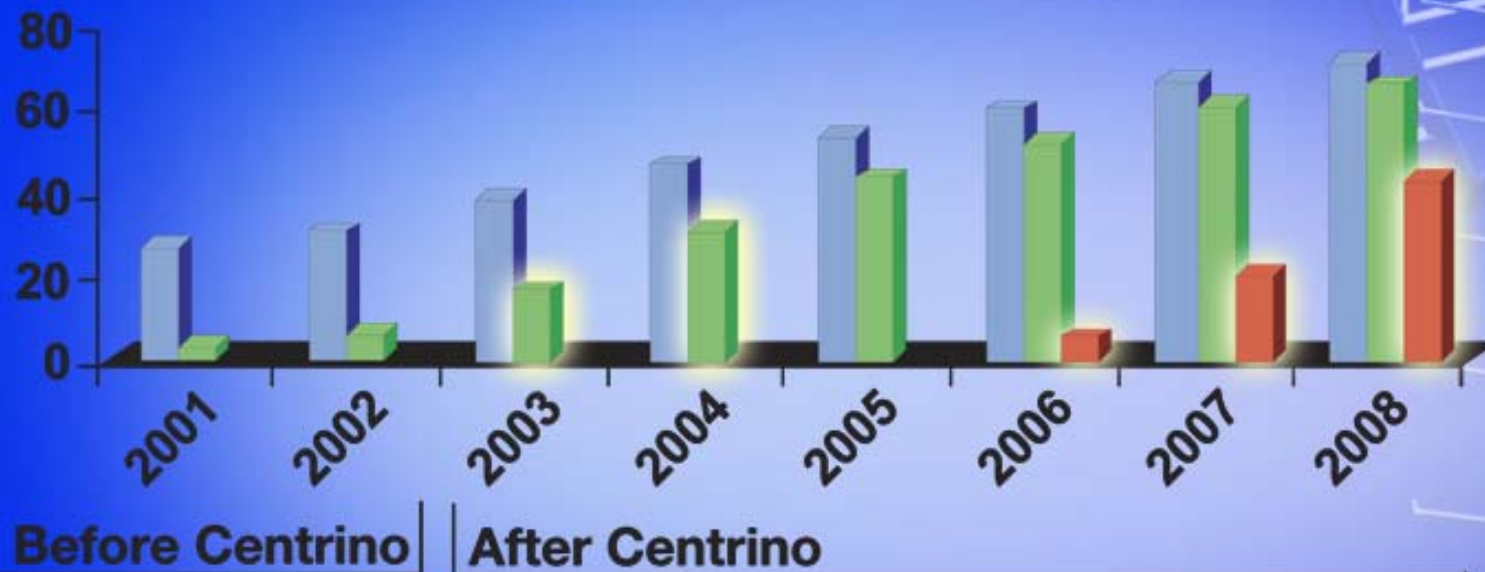
Source: ISDN: ITU Telecommunication Database '03  
Cable & Broadband: Gartner, Dataquest, Dell'Oro Wi-Fi: Instat



# Integration will Drive Adoption

- WiMAX Enabled Notebooks (Mu)
- Wi-Fi Enabled Notebooks (Mu)
- Total Notebook PCs (Mu)

Wi-Fi Inflection Point    WiMAX Inflection Point



# WiMAX Momentum

## One Year Ago



- 10 founding members
- Pre-WiMAX trials just beginning



WiMAX  
FORUM

## Today

- 140 Companies
- > 40 Service Provider Trials
- IEEE 802.16-2004 Standard Approved





# Next: The WiMAX Era

WiMAX will be to DSL/Cable  
what Cellular was to the landline.



The background of the slide is a photograph of several tall, lattice-structured communication towers. The towers are silhouetted against a sky that transitions from a deep blue at the top to a lighter, hazy blue near the horizon. In the foreground, the dark silhouettes of evergreen trees are visible. The overall scene suggests a telecommunications infrastructure in a natural setting.

# Delivering WiMAX Silicon

First Integrated 802.16-2004  
System on a Chip



# Evolution of Computing

## Parallelism

Mainframe  
Server  
Workstation

**NEXT**  
Personal Parallel  
Computing

**Centrino™**  
*mobile technology*

**2003**  
Convergence

**MMX**  
**1997**  
Multimedia

**1990**  
Windows  
*Integrated  
Floating Point  
& Cache*

**8088**  
**1981**  
The First PC

**“10X”**  
The dawn of dual-core microprocessors represents a fundamental shift in thinking of how microprocessors are designed.”

*Forbes.com, August 24, 2004*

# Why Parallelism?

Because we still can't solve everyday problems



# Tomorrow's Digital Home

## Recognition



Who is Grandma ?

## Mining



Is grandma in this video?

## Synthesis



What if we had been to the zoo with Grandma?

***Going beyond managing the digital archive***



# Tomorrow's Digital Office

Recognition



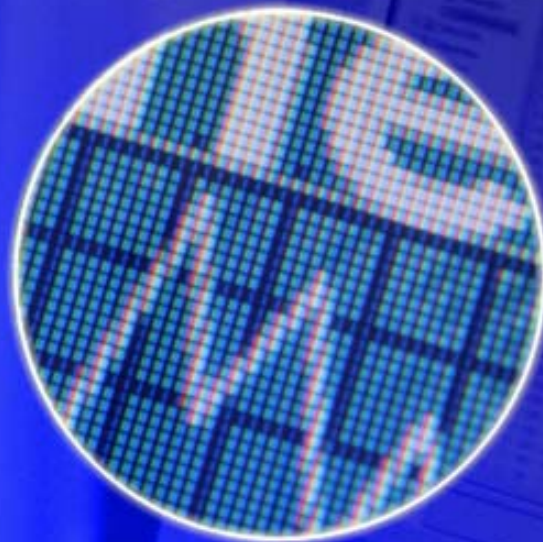
What is *hedge*?  
What is *interest-rate*?

Mining



Is there a hedging  
opportunity here?

Synthesis



What if interest rates  
were to go up?

**Actionable data mining in real-time**



# Driving Parallelism

Moving from Chips/Computer to Computers/Chip			
	2004	2005	2006*
Desktop (Perf)	55% HT	Shipping Dual-Core	> 40% Dual-Core
Servers	100% HT	Shipping Dual-Core	> 85% Dual/Multi-Core
Mobile (Perf)		Shipping Dual-Core	> 70% Dual-Core

All CPU development  
on Dual/Multi-Core

Unique Dual/Multi-Core  
Products in all segments

# Next generation Dual-Core Itanium® processor



“

Eventually **one billion** transistors, or electronic switches, may crowd a single chip, 1,000 times more than possible today.

*National Geographic, 1982*

”

Montecito  
**1.7B** transistors

## Next Generation – Montecito

- Dual Core *and* Multithreaded
- >3X increase platform bandwidth
- Higher performance, lower power
- 24MB Cache



# NASA's Project Columbia

## The Fastest Computer on Earth

Powered by Intel® Itanium® 2 processors

**~60 TFLOPs\* – 10240 CPUs**

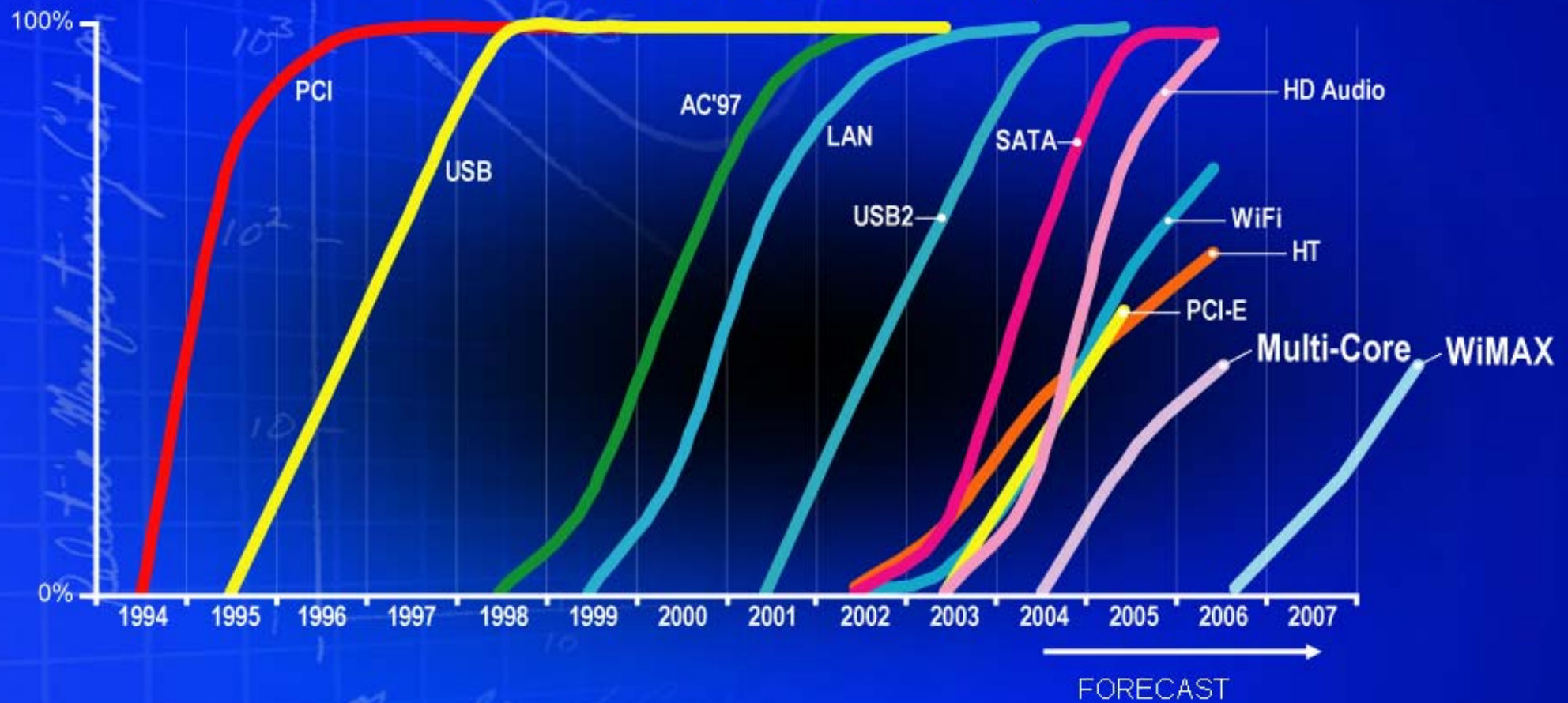
Rank	Site Country/Year	Computer / Processors Manufacturer	R <sub>max</sub> P
1	<del>Earth Simulator</del>	<del>NEC</del>	<del>35860</del>
2	<u>Lawrence Livermore National Laboratory</u> United States/2004	<u>Thunder</u> <u>Intel Itanium2 Tiger4 1.4GHz -</u> <u>Quadrics / 4096</u> California Digital Corporation	19940 22938
3	<u>Los Alamos National Laboratory</u> United States/2002	<u>ASCI Q - AlphaServer SC45,</u> <u>1.25 GHz / 8192</u> HP	13880 20480
4	<u>IBM - Rochester</u> United States/2004	<u>BlueGene/L DD1 Prototype</u> <u>(0.5GHz PowerPC 440</u> <u>w/Custom) / 8192</u> IBM / LLNL	11680 16384

\*Estimated

# The MAGIC of Moore's Law

*Design for the rising baseline*

% of Intel Client Silicon with New Capabilities







# Surfing THE SURGE

- Design and Market for a Digital Planet
- Leverage 10x Factors

***Pervasive Wireless Broadband***  
***Pervasive Parallelism***